

5th BSME International Conference on Thermal Engineering

Quality assurance and accreditation of engineering education in Bangladesh

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Abstract

The quality engineering education is not only challenging but also of paramount importance in today's globalised world. Despite inheriting western engineering education system, the engineering and technological qualifications obtained in Bangladesh are not readily recognized globally mainly due to the absence of periodical accreditation and quality assurance processes. The recently created Board of Accreditation for Engineering and Technical Education (BAETE) under the Institution of Engineers Bangladesh (IEB) has become a provisional member of Washington Accord. However, it needs to develop and implement accreditation process as par the signatory countries. This paper provides a comprehensive accreditation process followed by a Washington Accord Signatory nation and highlights the steps that can be undertaken within the institution to enhance the quality of education and graduates'/students' satisfaction.

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Selection and peer review under responsibility of the Bangladesh Society of Mechanical Engineers

Keywords: Engineering education; quality assurance; course curriculum; accreditation; student feedback.

1. Introduction

The globalization and mobility have created unique opportunities for the flow of technology, knowledge, people, skills, money, transshipment of industries, goods and services, values, and ideas across the borders. Engineering education has become an integral part of this globalization as engineering graduates from a country can undertake employment in another country through permanent or temporary relocation. This international mobility of engineering graduates has compelled educational institutions to enhance the quality and standard by introducing various quality assurance and professional accreditation processes. The educational institutions, employers, and professional organizations have a keen interest in the quality of education received by engineering graduates who aspire to be internationally mobile especially in today's globalised economy. This quality assurance and professional accreditation are more important for countries which rely on human resources export and import [1-3, 6].

Quality assurance mechanisms for engineering education vary considerably from country to country ranging from strong peer-run accreditation programs to large government bureaucracies. The accreditation methods used by the Washington Accord signatory countries (details are given later) are considered to be the best developed and most well respected systems for the accreditation of engineering education in the world [3]. As a low middle income nation, Bangladesh with its

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approximate 150 million populations has set a target to become a middle income county by 2020 [2]. However, to achieve this goal, it needs to accelerate its current Gross Domestic Product (GDP) growth to a double digit figure for which Bangladesh needs to invest heavily in skills development. Without quality engineering and technologically skilled human resources, Bangladesh will not be able to attract large scale foreign and local investments in manufacturing and technology intensive industrial sectors. As a result, with 'low skills and low pay' workforce, the country will not be able to achieve its double digit annual GDP growth target and to become a well-known nation.

Despite having one of the largest pools of science stream high school graduates (more than about 200,000) each year through Higher School Certificated (HSC) exams, the country's current higher education systems cannot accept more than 10,000 students in undergraduate engineering programs offered by all public and private higher educational institutions [5]. Although places for undergraduate engineering programs have slightly increased over the time both in public and private sector institutions, still the yearly intake numbers are one of the lowest in the world [1-2]. A comprehensive overview of current engineering education in Bangladesh can be found in Chowdhury and Alam [2]. The primary objective of this paper is to discuss the importance of quality assurance in engineering education and accreditation process. The paper also describes some practices undertaken by the universities of the developed world for the enhancement of quality of engineering education. Some practices that can be applied with minor or no modification to Bangladesh's engineering education systems in order to enhance quality of engineering programs and to prepare graduates for global employment have also been discussed.

2. Quality assurance and accreditation of engineering education

As mentioned earlier, the quality of engineering education is of paramount importance. However, primary focuses of Bangladesh government and other relevant organizations in Bangladesh are currently given mostly on curriculum development and modernization as well as teaching staff professional development at primary level and lesser extent at secondary level educations [6]. No appreciable visible attempts which might draw attention of all concerned people have been made to modernize and improve the quality of tertiary level education systems in Bangladesh. We think through HEQEP (Higher Education Quality Enhancement Program undertaken by UGC, Bangladesh) some, although might not be appreciable, changes in facilities development are expected. At present, there is no clear guideline about tertiary program renewals, quality enhancement and quality assurance.

2.1. Objectives of contemporary engineering programs

The curriculum is the most important part of engineering education systems as it facilitates graduates for their immediate employment. Like any programs, the engineering program must ensure that its course structure is responsive to market needs and students demand. There is no doubt that curricula need continuously updating as new knowledge is added rapidly to our existing knowledge bank [1-2]. Engineering programs must be designed to comply with the stage 1 competency standards [4]. This competency includes 3 main areas and 16 sub areas which are as follows:

- (a) Knowledge and skill base
 - Comprehensive, theory based understanding of the underpinning natural and physical science and the engineering fundamentals applicable to the engineering discipline
 - Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline
 - In-depth understanding of specialist bodies of knowledge within the engineering discipline
 - Discernment of knowledge development and research directions within the engineering discipline
 - Knowledge of contextual factors impacting the engineering discipline
 - Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline
- (b) Engineering application ability
 - Application of established engineering methods to complex engineering problem solving
 - Fluent application of engineering techniques, tools and resources
 - Application of systematic engineering synthesis and design processes
 - Application of systematic approaches to the conduct and management of engineering projects
- (c) Professional and personal attributes
 - Ethical conduct and professional accountability
 - Effective oral and written communication in professional and lay domains
 - Creative, innovative and pro-active demeanour

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